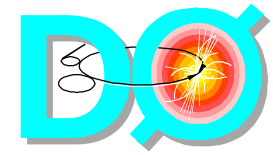

L1Muo Status and Results

Hardware/Software Status
Verification
Data/MC results

Rob McCroskey
University of Arizona
for the
L1 Muon Group

Trigger Workshop
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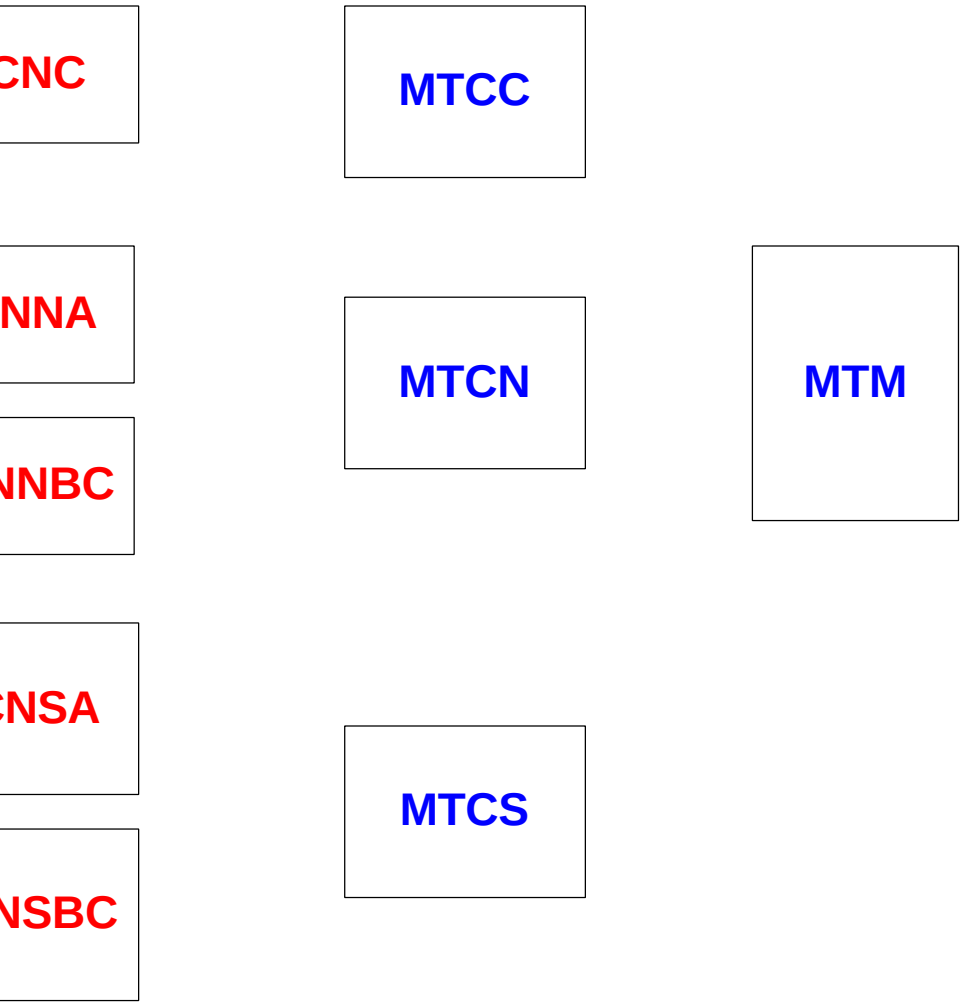
L1Muo System Overview



Hardware Status/ MCEN System

- Reading out 5/5 crates
- Scintillator concentrator logic online since Oct. shutdown
- Centroid cards working but not yet in trigger
- Issues:
  - North B/C crate has readout problems with 2 cards
    - Current theory is phase of bc-clock to rf-clock on backplane
  - South B/C has 12/16 cards installed
    - PS trips with 13+ cards
    - Current readback flutuates ±8A
    - Will swap with spare PS
  - SRQ timeouts (readout error)
    - Affects all crates to some degree (<1/day to several/day)

Hardware Status/ L1Muo System

- Reading out 4/4 crates
- Issues:
  - Re-doing 10 wire flavor boards
    - Existing boards have BGA short/open problems after assembly
    - Expect to have June 1
    - Testing of new boards 1-2 day process
  - Buffering on trigger cards
    - Tracking down one last(?) problem that causes some boards to 'walk' out of synchronization
    - Will look at input data this week
  - L3 hotlink errors seen in self-test mode

Firmware Status

	% Done	Online	To do	Est.
Central Scint	60	yes	CFT/New roads	June
Central Wire	85	yes	Bottom octants	May
Forward Scint	90	yes	CFT/New roads	May
Forward Wire	40	no	Make roads	July
Centroid	100	yes		
Concentrator	100	yes		

Firmware Release Procedure

- Produce FPGA equations
- Simulate in MaxPlusII for logic and timing
- Document rates/efficiencies with data
- Put logic in simulator
- Document efficiencies with MC
- Look at hardware/sim. Comparison

-- Do above before going to trigger board with new triggers

Software Status

- tsim_l1muo in reasonable good shape
  - Uses muon FE hits from data or MC as inputs
  - Simulates L2 and L3 messages for each crate
  - Algorithm improvements underway
    - Current simulated triggers are the scintillator hardware triggers
    - Updating PDT triggers and CFT.Scint triggers to reflect upcoming firmware updates
- l1muo_analyze in good shape
  - Unpacks hardware and/or simulator messages

Monitoring

- LVPS monitoring GUI complete
- Crate control (cold start, restore) GUI complete
- Error/alarm GUI in progress
- Online l1muo_examine using l1muo_analyze exists
- Shifters record trigger and sanity rates per run
- Add tsim_l1muo to examine to form difference plots online

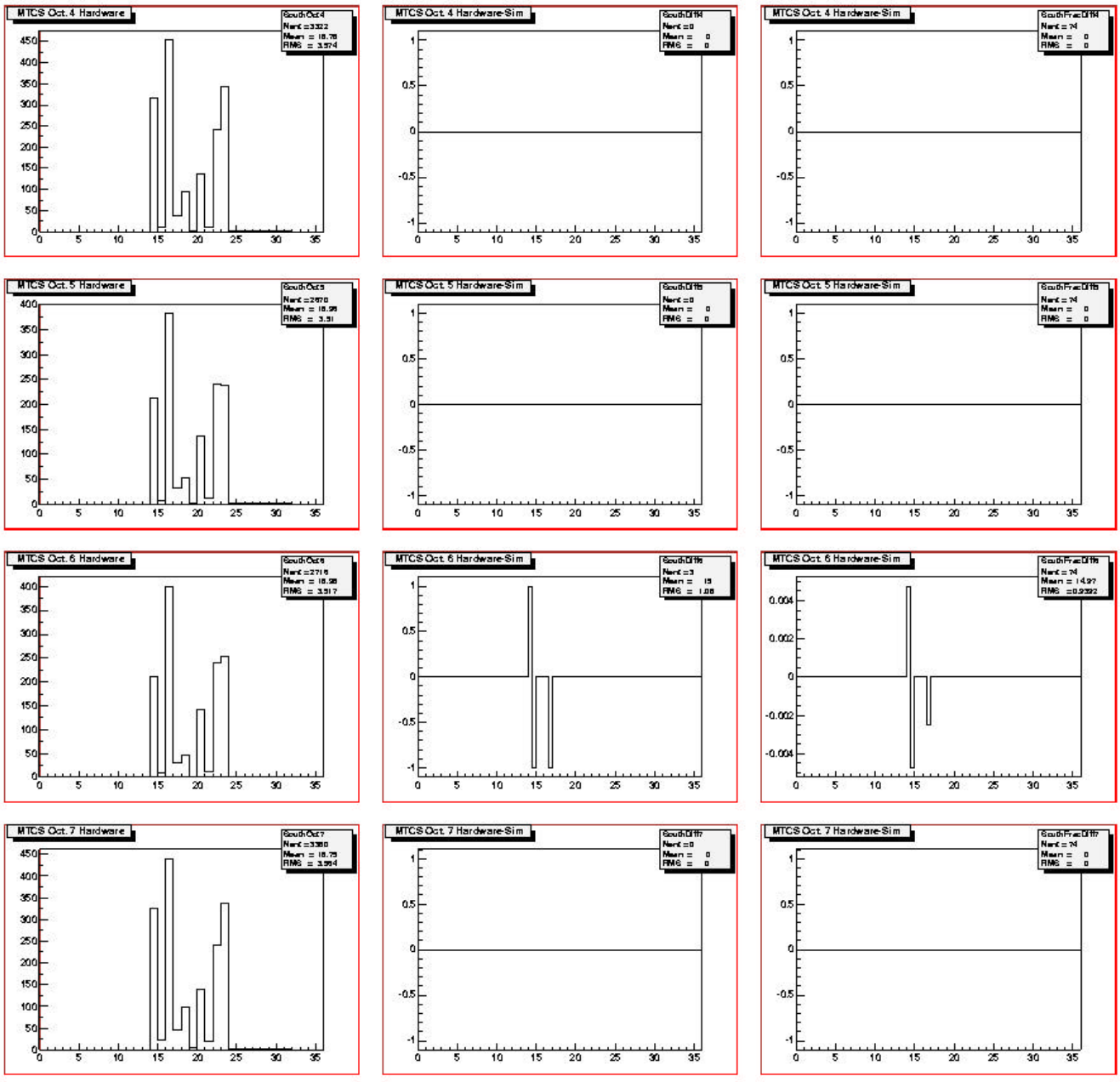
Verification

- In tsim_l1muo, muon input is from muon detector raw hits
- L1CFT input is from tsim_l1ft
- Hardware/sim comparisons:
  - Input data (MTCxx)
  - Octant triggers decisions (MTCxx and MTCM)
  - Regional trigger decisions (MTCM and MTM)
  - Global trigger decisions (MTM and TF)
  - Also use octant decisions from hardware to check regional and global triggers

Verification

- We currently run verification offline
- Simple script to select runs
  - Run tsim_l1muo and l1muo_analyze
  - Look at output and form difference and status plots
  - Copy to web page
- Will move this online
- Currently have <1% difference for single muon scint. triggers

Verification



Monte Carlo Efficiency

- "Acceptance"
  - denominator = single muons with 1<flat P_T<15 GeV/c and (-1<|h|<1 or -2<h<-1)
  - numerator = denominator and
    - cmsc-A > 0 and cmsc-C > 0 for CF
    - fmsc-A > 0 and fmsc-B > 0 for EF
- "Trigger Efficiency"
  - denominator = numerator of acceptance
  - numerator = denominator and
    - mu1ptxctxx
    - mu1ptxbtxx
- Results = numerator/denominator
  - acceptance and trigger efficiency plots for central region
  - ditto for forward region

Data Efficiency

- "Trigger Efficiency"
  - denominator = events passing CJT or EM triggers and have a reconstructed medium or tight muon
  - numerator = denominator and
    - mu1ptxctxx (via AND-OR terms)
    - mu1ptxbtxx (via AND-OR terms)
- Results = numerator/denominator
  - trigger efficiency plots for central and forward regions
  - average value understood
    - Low CF value combination of trigger gates and roads
  - pt dependence not understood

Data Purity

- Purity
  - denominator
    - mu1ptxctxx (via AND-OR terms)
    - mu1ptxbtxx (via AND-OR terms)
  - numerator = denominator and a reconstructed tight muon in that region
- Results = numerator/denominator
  - central = 7%
  - forward = 39%

Plans (2-4 weeks)

- Improved CF roads
- Begin looking at fake tracks from L1CFT
- Finish PDT logic
- Finish forward CFT.Scint logic
- Test comics download of trigger terms